EVERYDAY

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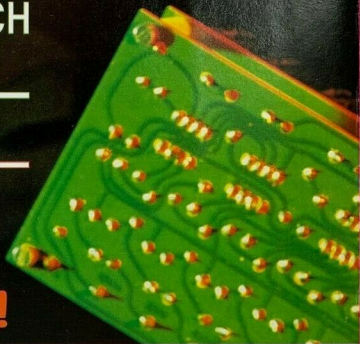
AMSTRAD SPEECH SYNTHESISER

QUIZMASTER

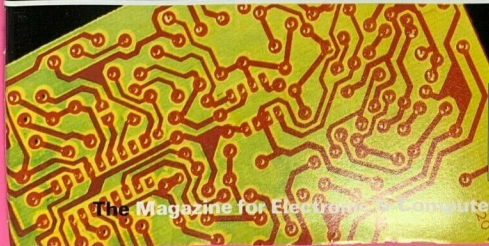## ELECTRONIC BAROMETER

FREE INSIDE!

SPECIAL AMATEUR RADIO SUPPLEMENT
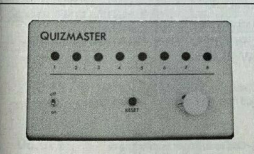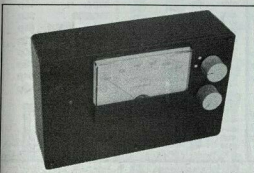
SHORT WAVE RECEIVER

DIY AERIALS

The Magazine for Electronics & Computer Projects
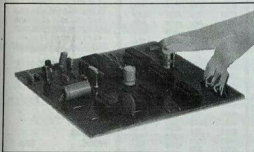
Cover photograph by Reflections of Bournemouth

QUIZMASTER

FREE   between pages 326 and 327
AMATEUR RADIO SUPPLEMENT (12-pages)
Shortwave Reception — Crystal Set — DIY Aerials — T.R.F. Receiver

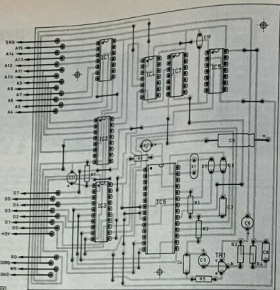Fig. 3. (above) Printed circuit board component layout and wiring details. (below) Full size printed circuit copper foil master pattern

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The second complication is that we require separate outputs for read and write operations. This is achieved by gating the output of IC2 with the RD (read) and WR (write) lines of the CPC expansion bus, using a separate OR gate for each of these two lines. This gives a negative read pulse from IC4b, and a negative write pulse from IC4a.

A positive pulse is needed for the ALD input of the speech chip, and this is derived from the write output via inverter IC7. The six bit latching output for IC6 is provided by IC3, which is actually an octal D type flip-flop. In this case only six of the flip-flops are used, with the two "spare" just being ignored. IC4a provides a negative pulse to the "clock pulse" input of IC3 during write operations to the interface, and this latches the outputs of the flip-flops.

To switch on a negative read pulse it is supplied to IC3 by C11. This ensures that IC3 commences with all its outputs low, and that the speech chip does not produce any output until the user activates it. R7 ensures that C11 is rapidly discharged when the computer is switched off, so that a fresh reset pulse is produced when it is switched on again.
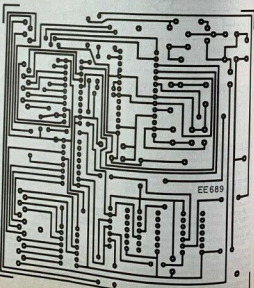
IC5 is a quad tri-state buffer, but in this circuit only one buffer is used and no connections are made to the other three. It interfaces the LRQ output of IC6 to D7 of the CPC expansion bus, and it is not to the active state by the output pulses from IC4b during read operations to the speech synthesiser.

Power for the speech synthesiser is obtained from the +5 volt supply output of the CPC expansion port. C9 provides smoothing which helps to give a low noise level on the audio output of the unit.

CONSTRUCTION

Details of the printed circuit board are provided in Fig.3. Crystal X1 must be a miniature wire-ended type with 0.2 inch lead spacing if it is to fit easily onto the board. Try to complete the soldered joins reasonably rapidly when fitting this component as some crystals are relatively easily damaged by heat; IC6 is a MOS integrated circuit, and as such it is vulnerable to damage by static charges.
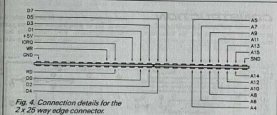
Leave this component in its anti-static packaging until, in all other respects, the unit is finished. Then fit this component onto the board, handling it as little as possible, avoiding touching the pins and fitting it into a holder already fitted to the board so that there is no need to make any direct solder connections to the chip.

With a fairly large integrated circuit of this type, IC6 can be a bit difficult to fit into its socket. Usually the pins have to be carefully bent inwards slightly. Be careful not to buckle any of its pins when fitting IC6 into its socket. Although none of the other integrated circuits are static sensitive types, it is recommended that they should be fitted in holders.

There should be no difficulties in fitting the other components onto the board provided the correct type of capacitor are used. In particular, the polyester types should have a lead spacing of 7.5 millimetres (0.3 inches). Be careful to fit the electrolytic capacitors with the correct polarity. A number of link wires are required, and these can be made from 22s.w.g. tinned copper wire, or the leads trimmed from the resistors and capacitors might be sufficient.

The board is connected to the computer via a 25-way ribbon cable which is fitted with a 2 by 25-way 0.1 inch pitch edge connector at the computer end. At the other end it is either connected directly to the board, or via pins if preferred.

Both ends of the cable should be prepared by separating all the wires, stripping a few millimetres of insulation from each one, and tinning them all with solder. The terminals of the edge connector (or the twenty five that are used anyway) should be tinned with solder, as should the pins on the board if this method of connection is adopted.

In my experience the CPC computers are not tolerant of long connecting leads on their expansion bus. It is therefore recommended that the connecting cable should be no more than about 0.6 metres long.

The edge connector connection details are given in Fig.4. The board has been designed so that the order of the connections on the board matches up well with that of those on the edge connector. There is no need for any crossing over of wires, but you still need to be very careful to get each lead connected to the right terminal of the edge connector.

The multi-coloured "rainbow" ribbon cable is better for this sort of thing, but grey ribbon cable is usable if you take extra care. If you are using a connector fitted with the appropriate polarising key, make quite sure that you have the connector the right way up before making the connection to it.

If the connector is not fitted with a polarising key, clearly mark the top and bottom edges such as to minimise the risk of fitting it to the expansion port up-side-down. Once this wiring has been completed, check it very thoroughly at least once before connecting the unit to the computer and trying it out.

Projects of this type are often left as unused boards, as was the prototype. However, it should not be difficult to fit the unit into a small plastic case if preferred. This does have the advantages of being a bit neater, and keeping dust etc. off the circuit board.

Completed circuit board showing all the i.c.s mounted in i.c. holders.

Fig. 4. Connection details for the 2 x 25 way edge connector.